DOCUMENT RESUME

ED 373 988 SE 054 750

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TITLE Differences in Asian- and Anglo-American Students' Motivation and Learning Environment in Mathematics.
SPONS AGENCY Eisenhower Program for Mathematics and Science Education (ED), Washington, DC.
PUB DATE Apr 94
CONTRACT R168D00311
NOTE 29p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 5-8, 1994).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Anglo Americans; *Asian Americans; Beliefs; Classroom Environment; *Elementary School Students; Ethnic Studies; Grade 6; Grade 7; Grade 8; Intermediate Grades; *Junior High School Students; *Mathematics Education; Middle Schools; Sex Differences; *Student Motivation; Surveys
IDENTIFIERS Classroom Environment Scale (Fraser and Fisher); Instructional Learning Environment Questionnaire; *Middle School Students; Multidimensional Motivation Instrument

ABSTRACT

Asian-Americans' exceptional academic achievement has generated a great deal of interest on the part of educators in search of explanations for the phenomenon. In particular, Asian-Americans' mathematics achievement has been remarkable and many studies have found these students outperforming students from other ethnic groups. A study was conducted in the five middle schools of a multicultural school district in a major metropolitan city in the Central South region of the United States. The school district was selected because of the relatively large enrollment of Asian-Americans among minority students (about 20.4% were Asian-Americans). A stratified sample of 1,200 Asian-Americans and 1,200 Anglo-Americans were randomly selected to be included in the study. Three standardized instruments--"Multidimensional Motivational Instrument," "Classroom Environment Scale," and "Instructional Learning Environment Questionnaire"--were adapted for use in this study. Results indicate that there are significant main effects of ethnicity, gender, and grade on middle school students' motivation and perceptions of learning environment in mathematics. Asian-American students reported greater pride in their classwork, stronger desire to succeed, higher expectations to do well in mathematics; but the students has significantly lower affiliation than Anglo-American students. Contains 46 references. (MKR)

Differences in Asian- and Anglo-American Students' Motivation and Learning Environment in Mathematics

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Paper presented at the annual meeting of the American Educational Research Association, New Orleans, April 1994.

This research was supported in part by the Department of Education, Office of Educational Research and Improvement, Eisenhower Program for the Improvement of Mathematics and Science Education Grant R168D00311. The opinions expressed in this study, however, do not necessary reflected the position, policy, or endorsement of the granting agency.

Differences in Asian- and Anglo-American Students' Motivation and Learning Environment in Mathematics

Asian-Americans' exceptional academic achievement has generated a great deal of interest on the part of educators in search of explanations for the phenomenon (d'Ailly, 1992; Sue & Okazaki, 1990; Yee, 1992). In particular, their mathematics achievement has been remarkable and many studies have found Asian-American students outperforming students from other ethnic groups. In a national comparison of eighth grade students' proficiency in mathematics, for example, Asian-American students outscored all other ethnic groups on higher-level skills like problem solving and conceptual understanding (Hafner, Ingels, Schneider, Stevenson, & Owens, 1990). Asian eighth grade students were also found to have higher grades and to take more advanced math or algebra classes than students from other ethnic groups. Results from the National Assessment of Educational Progress also found Asian-American students scoring higher on the mathematics proficiency tests in grades 7 and 11 than all other ethnic groups (Dossey, Mullis, Lindquist, & Chambers, 1988).

Many empirical studies, review articles, and theoretical/conceptual articles have investigated plausible hypotheses and explanations for Asian-American students' outstanding performance. Some of the contributing factors that have been examined include heredity, culture, neuropsychology, and parenting styles (d'Ailly 1992; Fox, 1991; Karklanis & Tsai, 1988; Peng, Owings, & Fetters, 1984; Sue & Okazaki, 1990, 1991). Most of the findings from these studies and reviews, however, have been weak or inconclusive with the possible exception of the evidence suggesting that Asian-American parents' high expectations for their children influences their achievement. Schneider and Lee (1990), for example,

found a positive correlation between the Asian students' high achievement and the values that they share with their parents, the home learning activities in which families participate, and the expectations they share with their teachers and peers.

Although most of the research on Asian-American students has typically focused on biological, cultural, and home environment factors, other researchers have looked at Asian American students from a quite different perspective and have conducted international studies that have compared Asian education with schooling in the United States. Stevenson and Stigler (1992), for example, found that there are several characteristics that distinguish Asian students from that of students in the United States. They found that Asian parents have a more important role in setting high educational expectations for their children and their children's' schools. Instruction in Asian countries was also found to be more innovative and interesting than in the United States. In terms of student differences, Asian students were found to spend significantly more time doing homework and reading for pleasure than American students. Stevenson and Lee (1990) compared students' attitudes toward mathematics across three countries (United States, Taiwan, and Japan) and found that first grade students in Taiwan and Japan had higher attitudes towards mathematics than students from the United States, but fifth grade U.S. students had higher attitudes than fifth grade Chinese and Japanese students. In a self-evaluation of their own abilities, U.S. students had significantly higher ratings of (a) their own ability in mathematics, (b) potential for achievement, and (c) schoolwork than Chinese and Japanese students.

These international comparisons are useful because they have focused on how teaching and learning differ and how they influence students' mathematics achievement. These findings provide us with important educational policy implications, but they do not help us understand why Asian-American students

have excelled in mathematics in the United States. Only a few studies conducted in the United States have focused on schools and actually compared Asian-American students to other ethnic groups. Some research, for example, has examined teachers' perceptions of Asian-American and white students (Bannai & Cohen, 1985; Wong, 1980), but these studies have merely focused on perceived characteristics of students like communication skills, sociability, emotional stability, and academic competence rather than on other specific aspects of the instructional or classroom learning environment. In an ecological study on ethnic differences in adolescent achievement, Steinberg, Dornbush, and Brown (1992) found that Asian-American students had the highest level of peer support for academic achievement.

In a national study designed to describe the characteristics of eight grade students across the United States (NELS:88), Hafner, Ingels, Schneider, Stevenson, and Owens (1990) examined differences across student ethnicity and other background characteristics. In addition to finding that eighth-grade Asian-American students outperform students from all other ethnic groups in terms of mathematics achievement, they found that Asian-American students do much more homework than other students. Asian-American students were also much more likely to respond that (a) students and teacher get along, (b) discipline is fair, (c) teaching is good, and (d) teachers really listen to me. On the other hand, white students were more likely to respond that there is real school spirit than Asian-Americans. While these comparisons are informative, useful, and important, they do not, however, help us explain the Asian-American student success phenomenon because the sampling from the NELS:88 does not guarantee that these overall comparisons are made from similar types of schools. Asian-American students, for example, were found to be more likely to be enrolled in

Catholic and independent schools than other racial or ethnic subgroups and less likely to be enrolled in public schools.

There is a need for more studies that compare Asian-American and Anglo-American students from the same schools because such comparisons may help us understand why Asian-American students score significantly higher in mathematics than other students in the same schools and classes. The implications of such findings may also help use narrow the learning gaps for students from other cultural groups.

One important area that has not been widely investigated within the study of Asian-American students' success in mathematics is that of their motivation and classroom learning environment in mathematics. Very few studies have actually compared motivational and socio-psychological variables between Asian-American and Anglo-American students from the same classes and schools. Systematic, randomized studies need to be conducted so that we can compare Asian-American students to students from other ethnic groups in mathematics classes. It is also important to examine motivational factors like achievement motivation and academic self-concept along with socio-psychological factors like affiliation and involvement because they have been found to be important factors that contribute to student learning (Fraser, Walberg, Welch, & Hattie, 1987; Walberg, 1986, 1988). Little research, however, has directly focused on the investigation of Asian-American students' motivation and perceptions of their learning environment, and how these are compared with majority students in the same classroom. These questions are significant because the close relationship between motivation, perceptions of learning environment, and student learning outcomes are well documented (Fraser, 1989, 1991; Knight & Waxman, 1991; Padron, 1992; Waxman, Huang, Knight, & Owens, 1992; Wittrock, 1986).

Examining classroom learning environments is also important because it emphasizes the student-mediating or student cognition paradigm (Knight & Waxman, 1991; Wittrock, 1986). This paradigm maintains that how students perceive and react to their learning tasks and classroom instruction is more important in terms of influencing student outcomes than the observed quality of teaching behaviors (Winne & Marx, 1977, 1982). In other words, this paradigm assumes that better understanding and improvement of teaching and learning can emerge by examining the ways that classroom instruction and the learning environment are viewed or interpreted by the students themselves since students ultimately respond to what they perceive is important (Doyle, 1977; Schultz, 1979). This paradigm also suggests that the classroom environment experienced by the student may be quite different from the observed or intended instruction (Waxman, 1989; Wittrock, 1986).

Although the classroom learning environment has been studied extensively in recent years, still little is known about the ways in which some students perceive content-specific aspects of their learning environment. Very few studies, for example, have examined Asian-American students' perceptions of the learning environment in mathematics. Another crucial aspect that should be considered when studying the classroom learning environment is students' motivation. Student motivation to learn and classroom learning environments have often been researched and discussed separately, but they are so closely related conceptually that they also need to be empirically examined together (Knight & Waxman, 1990). Only a limited number of studies, however, have investigated the classroom learning environment and students' motivation.

Purpose of the Study

The purpose of the present study is to compare Asian- and Anglo-American students' motivation and perceptions. More specifically, the present study addresses the following research questions:

(a) What are Asian- and Anglo-American students' motivation and perceptions of their mathematics learning environment in the dimensions of Academic Self-Concept, Achievement Motivation, Involvement, Affiliation, Satisfaction, and Parent Involvement?

(b) Are there significant differences between Asian- and Anglo-American students' motivation and perceptions of their learning environment in mathematics?

(c) Are there significant differences in students' motivation and perceptions of their learning environment in mathematics by gender and grade level?

In addition, the present study compares some background characteristics, student academic aspirations, attendance records, and time allocation of Asian- and Anglo-American students.

Methods

Subjects

The present study was conducted in the five middle schools of a multicultural school district located in a major metropolitan city in the Central South region of the United States. The school district was selected because of the relatively large enrollment of Asian-Americans among minority students. About 20.4% of the students enrolled in the District were Asian-Americans, 30.6% of them were Anglo-Americans (i.e., White, non-Hispanic), 26% of them were African-Americans, and 23% were Hispanics. Most of the students in the district came from lower- to upper-middle income families. Their overall academic

achievement was slightly higher than national norm. Asian-American middle school students in this district scored significantly higher than all other ethnic groups (including Anglo-Americans) on state-wide standardized achievement tests in mathematics and on the district-administered Four-Step Problem Solving Test (Hofmann, 1986). A stratified sample of 1,200 Asian-Americans and 1,200 Anglo-Americans were randomly selected to be included in the study. A stratified sampling technique was used in order to obtain an equal number of students by gender and grade within each ethnic group.

Instruments

Three standardized instruments were adapted and incorporated for use in the present study: (a) the Multidimensional Motivational Instrument (Uguroglu, Schiller, & Walberg, 1981; Uguroglu & Walberg, 1986), (b) the Classroom Environment Scale (Fraser, 1982, 1986), and (c) the Instructional Learning Environment Questionnaire (Knight & Waxman, 1989).

The Multidimensional Motivational Instrument (MMI) is a questionnaire that measures the motivation constructs of Achievement Motivation, Academic Self-Concept, and Social Self-Concept. The instrument has been found to have test-retest reliability and construct and predictive validity. For the present study, only Achievement Motivation and Academic Self-Concept scales were used. A brief description of the scales follows:

Achievement Motivation--the extent to which students feel the intrinsic desire to succeed and earn "good" grades in mathematics.

Academic Self-Concept--the extent to which students exhibit pride in their classwork and expect to do well in mathematics.

The Classroom Environment Scale (CES) contains six scales, each with four items. The content and concurrent validities of the CES have been established through correlational studies and classroom observation. Adequate internal consistency reliability coefficients were also obtained in previous studies (Fraser, 1982, 1986; Moos, 1979). For the present study, only the Involvement and Affiliation scales were used. A brief description of the two scales follows:

Involvement--the extent to which students participate actively and attentively in their mathematics class.

Affiliation--the extent to which students know, help, and are friendly toward each other in their mathematics class.

The Instructional Learning Environment Questionnaire (ILEQ) measures students' perceptions of seven aspects of instructional learning environment. It has been found to be reliable in previous studies (Knight & Waxman, 1989, 1990) For the present study, only the Satisfaction and Parent Involvement scales were used. A brief description of the two scales follows:

Satisfaction--the extent of students' enjoyment of their mathematics class and school work in mathematics.

Parent Involvement--the extent to which parents are interested and involved in what their children are doing in mathematics.

Each scale from the three instruments includes four items and all of the items were measured on a four-point Likert-type scale. A response of "not at all true" corresponds to the value of "1,"; not very true", "2"; "sort of true", "3"; and "very true", "4." Students' responses to each item within the same scale were added and averaged Consequently, a mean value of 4 indicates that the student responded favorably with the scale whereas a mean value of 1 indicated that the student responded unfavorably to the scale. In the present study, the reliability

coefficients (Cronbach's alpha) of the six scales, Achievement Motivation, Academic Self-Concept, Involvement, Affiliation, Satisfaction, and Parent Involvement are .57, .54, .71, .64, .83, and .63 respectively. Several background items selected from the National Educational Longitudinal Study (NELS:88) were also included in the combined study survey (Ingels, Abraham, Karr, Spencer, & Franekel, 1990). These items included questions about students' (a) background characteristics (b) academic aspirations, (c) mathematics grades, (d) attendance, and (e) time allocation.

In addition, some background items regarding students' mathematics grades, academic aspirations, attendance records, and time allocation from the NELS:88 were incorporated to provide data on student characteristics.

Procedures

The three instruments and the background items from the NELS:88 survey were combined into one survey and were administered concurrently by trained researchers in the Spring Semester during students' regular mathematics class. Students were informed by the researchers that they were not tests and that completed questionnaires would not be seen by their teachers or other school personnel.

Chi-square tests were used to compare the frequencies of responses between Asian-American and Anglo-American students on the items from the NELS:88 survey. A three-way multivariate analysis of variance (MANOVA) was used to determine (a) whether there are motivational and perceptional differences by students' gender, grade, and ethnicity, and (b) whether there are any interaction effects by gender and/or grade-level within each ethnic group. Because of the large sample size, the probability level was set at $p<.001$ for

overall MANOVA results. As a follow-up procedure, univariate analysis of variance (ANOVA) and post hoc multiple comparison tests were also performed to determine where the significant differences were.

Results

Table 1 presents some background information of the two student groups. Significant differences were found in many background items between Asian- and Anglo-American students. Among the 1,200 students in each group, significantly more Asian-American students spoke non-English language before they started going to school. More Asian-American students than Anglo-American students received "A" grades in mathematics from last year and this year. While there was no significant difference between the two student groups in how much students were sure that they would graduate from high school, more Asian-American students than Anglo-American students were sure that they would attend graduate schools.

Asian-American students also had better attendance records. A greater number of Asian-American students had perfect attendance than Anglo-American students. Nearly equal number of Asian- and Anglo-American students skipped classes, however. More Asian-American students than Anglo-American students spent over three hours per week on mathematics homework and on additional reading not assigned by teachers. More Anglo-American students spent over two hours on TV per day but relatively fewer Anglo-American students spent over two hours watching TV on weekends than Asian-American students.

Table 2 reports the three-way MANOVA results. The results indicate that there are significant main effects of ethnicity, gender, and grade on middle school

students' motivation and perceptions of learning environment. Asian-American students' overall motivation and perceptions of their mathematics classroom learning environment were significantly different from those of Anglo-American students ($F(6,2383)=12.06$, $p<.001$). Asian- and Anglo-American students' overall motivation and perceptions of their learning environment also differed by gender ($F(6,2383)=11.45$, $p<001$) and grade-level ($F(12,4776)=11.70$, $p<.001$). However, there was no significant interaction effects of (a) ethnicity by gender, (b) ethnicity by grade, nor (c) ethnicity by gender and grade. This suggests that the gender and grade effects did not differ from one ethnic group to another.

Table 3 presents the descriptive and univariate analysis of variance results for students' motivation and perceptions of ethnicity, gender, and grade level. In general, both Asian- and Anglo-American students had fairly positive perceptions of their learning environment in mathematics. Both groups of students scored high on the Affiliation aspect and relatively low on the Satisfaction aspect. Both groups of students also had high academic self-concept and achievement motivation ($M>3.0$). Nonetheless, Asian-American students' Academic Self-Concept and Achievement Motivation were significantly higher than those of Anglo-American students. They also reported more Involvement, Satisfaction, and Parental Involvement. On the other hand, Asian-American students reported significantly less Affiliation than Anglo-American students. The standard deviations for Anglo-American students were slightly higher than for Asian-American students, suggesting that there was greater variation among Anglo-American students' responses.

In regard to sex-related differences, girls scored almost equally high on academic self-concept as boys, but their achievement motivation was significantly higher than for boys. In addition, girls reported significantly more Involvement,

Affiliation, and Satisfaction than boys. There were no significant differences on the Parent Involvement scale between boys and girls. There was no significant sex by ethnicity interaction.

Grade-level is another significant factor that differentiates students' motivation and perceptions. Students in the lower grade levels generally had greater achievement motivation and more favorable perceptions of learning environment. Sixth grade students had significantly higher Achievement Motivation than seventh and eighth grade students. They also reported significantly more Involvement, Affiliation, Satisfaction, and Parent Involvement than students in the upper grades. Seventh grade students had significantly higher perceptions of Involvement, Satisfaction, and Parent Involvement than eighth grade students. There was no significant difference on Academic Self-Concept among students from the three grade levels. There was not a significant grade by ethnicity interaction, either.

Discussion

The results of the present study reveal that there are significant differences in motivation and perceptions of learning environment by students' ethnicity, sex, and grade-level. Although both Asian- and Anglo-American middle school students had high motivation and favorable perceptions, Asian-American students reported greater pride in their classwork, stronger desire to succeed, and higher expectation to do well in mathematics. These findings support previous research studies which similarly found that love of learning, deep determination to succeed, and family influence are among the Asian-American students' characteristics which lead to their academic success (Brand, 1987; Karklanis &

Tsai, 1989; Takaki, 1989). Strong motivation and positive perceptions of mathematics learning environment may partially explain why Asian-American students typically have greater mathematics achievement than students from other ethnic groups.

On the other hand, Asian-American students had significantly lower Affiliation than Anglo-American students. This finding is similar to the results from the NELS:88 study (Hafner, Ingels, Schneider, Stevenson, & Owens, 1990), and there are several plausible explanations for this finding. First, Asian-American students devote themselves in learning and have less time for socializing. Their background information, for example, illustrates how they spent much more time on mathematics homework and additional reading than Anglo-American students. Another explanation is that Asian parents may not encourage their children to hang around with friends for activities they consider to be non-educational. Future research may examine the relationship of these factors on students' Affiliation to justify these explanations

Unlike previous studies which found unequal instructional practices in mathematics classroom in favor of boys (Hart, 1990; Nairn, 1991), results from the present study indicate that middle school girls had higher motivation and more positive perceptions of their learning environment in mathematics than boys. Despite the many reports which documented that boys performed better than girls in mathematics achievement (Dossey, Mullis, Lindquist, & Chambers, 1988), girls similarly expected to do well in mathematics and showed a even stronger desire to earn good grades than boys. Girls were also more participative and attentive in class, more affiliated with classmates, and enjoyed mathematics class more than boys. This suggests that the inequity in mathematics achievement may be attributable to other factors such as confidences in

mathematics, level of anxiety, unequal teachers' expectation and/or attention, and so forth (Marrett, 1985; Nairn, 1991).

Middle school students at different grade-levels demonstrated different levels of motivation and perceptions of their learning environment in mathematics. In general, the lower the grade level, the more involved and satisfied they were. These findings were in agreement with other observational studies which found that sixth grade students were more on task and less disruptive in the mathematics classroom than seventh and eighth grade students (Huang & Waxman, 1993a, 1993b). Students at the three grade levels had homogeneously high Academic Self-Concept, but their Achievement Motivation declined as grade level moved up, parallel to their perceptions of learning environment. Numerous variables may contribute to the downward trends. Perhaps the increasing difficulty in mathematics content had posed some stress on higher grade students. Perhaps the decreasing amount of parent interest and involvement also affected student motivation. These findings raise some concerns. Educational researchers need to identify these variables and to provide strategies that may improve upper-grade students' motivation and perceptions.

The results of the present study also reveal that within each ethnic group, the effects of grade and gender remained consistent. In other words, both Asian- and Anglo-American girls had higher achievement motivation and more favorable perceptions of learning environment than boys, as did both Asian- and Anglo-American lower-grade students as compared to higher-grade students.

Implications for Future Study

Although research on motivation and classroom learning environments has made significant progress over the past three decades, there are still additional

areas that need further investigation. In order to capture all the processes and nuances that occur in classrooms, triangulation procedures are needed to collect data from multiple perspectives (Evertson & Green, 1986). Collecting multiple measures or indicators of classroom processes may help alleviate some of the concerns and criticisms of learning environment research and provide us with a more comprehensive picture of what goes on in classrooms. Student and teacher self-report survey and interview data as well as more qualitative, ethnographic data (e.g., extensive field notes) could all be used to help supplement the motivation and learning environment data.

Although the findings summarized by the motivation and learning environment research in the present study suggest several important directions, further correlational, longitudinal, and especially experimental research is needed to verify these results. Other research questions that still need to be investigated in this area include examining (a) innovative approaches for improving students' motivation and the classroom learning environment, (b) whether there are other contextual variables (e.g. subject area) that influence students' motivation and perceptions of the classroom learning environment, (c) if teacher characteristics such as training and experience influence learning environments in mathematics, and (d) what other teaching variables or learning factors influence Asian-American students' performance in mathematics. More studies are also needed to examine differences between Asian-American students and students from other ethnic groups on their cognitive learning strategies and problem-solving in mathematics. Since motivational and learning environment research has not been able to explain how students cognitively interact with process variables (Winne, 1987), further research may need to specifically focus on students' cognitive operations and observations of students' responses. These and similar issues still

need to be examined so that we can continue to understand why Asian-American students succeed in mathematics.

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Table 1
Background Information of the Two Student Groups

Indicators	Asian (n = 1,200) f	%	Anglo (n = 1,200) f	%	*Chisq.*
Background Characteristics					
Spoke non-English language before you started going to school.					952.28**
Yes	896	74.8	155	12.9	
No	304	25.2	1,045	87.1	
Have been held back a grade in school					4.77
Yes	208	17.3	248	20.7	
No	992	82.7	952	79.3	
Math grade received last year					113.39**
Mostly A's (90-100)	763	63.6	509	42.4	
Mostly B's (80-89)	317	26.4	472	39.3	
Mostly C's (75-79)	84	7.0	131	10.9	
Mostly D's (70-74)	24	2.0	62	5.2	
Mostly below D (below 70)	12	1.0	26	2.2	
Math grade received this year					97.16**
Mostly A's (90-100)	656	54.7	441	36.8	
Mostly B's (80-89)	385	32.1	447	37.3	
Mostly C's (75-79)	91	7.5	171	14.1	
Mostly D's (70-74)	40	3.3	73	6.1	
Mostly below D (below 70)	28	2.3	68	5.7	
Academic Aspirations					
Sure that you will graduate from high school					4.99
Very sure	956	79.7	933	77.8	
Probably sure	185	15.4	218	18.2	
Probably won't graduate	36	3.0	15	2.1	
Very sure won't graduate	23	1.9	24	2.0	
How far in school you will get					68.73**
Won't finish high school	36	3.0	30	2.5	
Will graduate from high school only	33	2.8	59	4.9	
Will attend college	79	6.6	120	10.0	
Will graduate college	431	35.9	562	46.8	
Will attend graduate school	621	51.8	429	35.8	

	Asian		Anglo		
	f	%	f	%	*Chisq.*
Attendance Record					
Days of school you missed over the past 4 weeks					94.67**
Perfect attendance	850	70.9	619	51.6	
Missed 1 or 2 days	226	18.8	368	30.7	
Missed 3 or 4 days	81	6.7	141	11.8	
Missed 6 to 10 days	31	2.6	55	4.6	
Missed more than 10 days	12	1.0	17	1.4	
How often you cut or skip classes					1.89
Never or almost never	1,088	90.7	1,081	90.1	
Sometimes, but less than once a week	68	5.7	63	5.3	
Not everyday, but at least once a week	21	1.7	24	2.0	
Daily	23	1.9	32	2.7	
Time Allocation					
Time spent on math homework each week					15.20**
None	76	6.3	101	8.4	
Less than 1 hour a week	318	26.5	361	30.1	
1 to 2 hours a week	403	33.5	408	34.0	
3 or 4 hours a week	241	20.1	211	17.6	
More than 4 hours	162	13.5	118	9.8	
Time spent on additional reading					14.00*
None	130	10.8	189	15.8	
1 hour or less per week	399	33.3	397	33.2	
2 hours per week	304	25.3	284	23.7	
3 to 4 hours per week	201	16.7	183	15.3	
5 hours per week	166	13.8	144	12.0	
Time spent on TV per day					17.69*
Don't watch TV	75	6.3	57	4.8	
Less than one hour per day	211	17.6	147	12.3	
1 to 2 hours a day	362	30.1	377	31.5	
2 to 3 hours a day	257	21.5	287	24.0	
Over 3 hours a day	295	24.6	328	27.4	
Time spent on TV on weekends					6.08
Don't watch TV	55	4.6	54	4.5	
Less than one hour a day	127	10.6	143	11.9	
1 to 2 hours a day	268	22.3	276	23.0	
2 to 3 hours a day	288	24.0	240	20.0	
Over 3 hours a day	462	38.5	486	40.5	
Time spent on listening to CD, tapes, radio, etc.					88.50**
None	166	13.8	81	6.8	
1 hour or less per week	366	30.5	254	21.2	
2 hours	284	23.7	296	24 7	
3 to 4 hours	172	14.3	223	18.6	
5 hours or more per week	212	17.7	346	28.8	

* p< .01. ** p<.001.

Table 2
MANOVA Results of Ethnicity, Gender and Grade Effects on Students' Motivation and Learning Environment

Variable	Wilks' Lambda	df	F	p
Ethnicity	.9705	6,2383	12.06	.0001
Gender	.9720	6,2383	11.45	.0001
Grade	.9436	12,4766	11.70	.0001
Ethnicity x Gender	.9976	6,2383	.97	.4414
Ethnicity x Grade	.9963	12,4766	.74	.7152
Gender x Grade	.9954	12,4766	.91	.5356
Ethnicity x Gender x x Grade	.9930	12,4766	1.40	.1581

Table 3
Descriptive and Univariate Analysis of Variance of Students' Motivation and Learning Environment by Ethnicity, Gender and Grade

By Ethnicity

Variable	Asian (n=1200) M	SD	Anglo (n=1200) M	SD	F	p
Involvement	3.00	.66	2.84	.69	34.01	.0001
Affiliation	3.10	.61	3.18	.65	8.56	.0035
Satisfaction	2.95	.79	2.74	.85	37.31	.0001
Parent Involvement	3.03	.69	2.96	.69	6.74	.0095
Academic Self-Concept	3.22	.54	3.13	.62	16.34	.0001
Achievement Motivation	3.20	.55	3.08	.58	27.83	.0001

By Gender

Variable	Male (n=1200) M	SD	Female (n=1200) M	SD	F	p
Involvement	2.88	.69	2.97	.67	12.86	.0001
Affiliation	3.07	.65	3.21	.61	28.81	.0001
Satisfaction	2.78	.85	2.91	.80	15.05	.0001
Parent Involvement	2.98	.68	3.01	.70	1.13	.2880
Academic Self-Concept	3.18	.61	3.17	.56	.11	.7410
Achievement Motivation	3.08	.60	3.20	.53	27.54	.0001

Table 3 (con'd)

By Grade

Variable	6th Grade (n=800) M	SD	7th Grade (n=800) M	SD	8th Grade (n=800) M	SD	F	p
Involvement	3.06a	.63	2.96b	.67	2.76c	.70	42.93	.0001
Affiliation	3.20a	.60	3.11b	.66	3.11b	.63	5.70	.0034
Satisfaction	2.96a	.83	2.88a	.81	2.70b	.82	20.33	.0001
Parent Involvement	3.11a	.67	3.00b	.69	2.86c	.69	25.49	.0001
Academic Self-Concept	3.18	.57	3.18	.58	3.16	.59	.33	.7220
Achievement Motivation	3.22a	.54	3.12b	.59	3.08b	.56	13.46	.0001

Note: the same letter by the mean values indicates that there is no significant difference between the mean values.